1. PURPOSE

This policy is to ensure WFU employee safety during welding and cutting operations along with the protection of property (including equipment) from Hot Work operations conducted at the University. Hot Work is defined as “work involving burning, welding, or similar operation that is capable of initiating fires or explosions.”

2. RESPONSIBILITIES

A. Environmental, Health, and Safety

EHS is responsible for reviewing hazards and incidents associated with Hot Work conducted on campus along with developing training programs for Hot Work operations, performing health hazard evaluations, and performing safety inspections of welding work areas and equipment.

B. Supervisor

Supervisors are responsible in making sure employees who will be performing Hot Work operations are properly trained on the WFU procedures before performing work on campus. A JSA should be developed that provides specifies written rules and instructions covering when Hot Work Permit is required, the safe operation of equipment, incorporating information from Safety Data Sheets (SDS) welding materials used, appropriate PPE, evaluation of combustible materials and hazardous areas present or likely to be present in the work location. Whenever a Hot Work Permit is required, the Supervisor is responsible for designating the following:

- Hot Work Operator: Is the Departmental Employee who is qualified and authorized by management to perform hot work such as welding, brazing, soldering, and other associated work tasks
- Permit Authorizing Individual: is the Departmental employee who trained and is authorized to issue a hot work permit by management.
- Protect combustibles with covers made of fire-resistant materials (see below for a description of approved fire-resistant materials for hot work).
- If possible, enclose the work area with portable, fire-resistant screens.
- Cover or block all openings, such as doorways, windows, cracks, or other openings with fire resistant material.
- When needed, have a qualified firewatcher in the work area during and for at least 30 minutes after hot work is finished.
- Do not dispose of hot slag in containers holding combustible material.
- Fire extinguishers shall be maintained in a state of readiness for instant use.
- Welding or cutting is not permitted in or near rooms containing flammable or combustible liquids, vapors, or combustible dusts. Do not weld or cut in atmospheres containing reactive vapors when heated.
- Provide safety supervision for outside contractors conducting hot work. Inform contractors about site-specific hazards including the presence of flammable materials.

B. Hot Work Permit Requirements

Employees that perform hot work outside of designated Welding Shop and Maintenance Shop areas must complete a WFU Hot Work Permit (see Appendix A) prior to conducting hot work operations and post original at job site and provide EHS with a copy of the initial (before work) and the final sign-off (after work is completed). The Supervisor, Departmental Permit Authorizing Individual (PAI), and Hot Work Operator are responsible for ensuring compliance with the permit requirements. The information contained on the WFU Hot Work Permit is based from NFPA 51B, Standard for Fire Prevention During Welding, Cutting, and Other Hot Work.

The PAI must document the following on the Hot Work Permit:

1. Date the Permit is being issued. A permit is only valid for one day of work.
2. Building/Location/Floor Level where hot work will be taking place.
3. Document type of work to be performed (i.e. overhead MIG welding)
4. The PAI then shall inspect the work area and confirm that precautions have been taken to prevent a fire. The PAI must complete the checklist outlined on the Hot Work Permit which includes observing special precautions needed during work such as posting a fire watch, and ensuring the hot work location is free from hazards within 35 feet of the work area where hot work is planned.
5. Document any special precautions needed during work such as the use of supplemental fire extinguishers, welding blankets, welding curtains, and ensuring combustible materials are not present and guarding materials that cannot be relocated as a last line of defense where hot work is planned.
6. The PAI must inspect if hot work is planned near or on walls, ceiling, and roofs. These areas must be inspected for fire hazards.
7. Hot work is prohibited on enclosed equipment, such as in, on, near, tanks, vessels, or containers that contain or have contained flammable substances.
8. Hot work is prohibited in areas with the accumulation of dusts.
D. Welding and Hot Work – In and Around Tanks

WFU adheres to U.S. Chemical Safety Board recommendations for welding or cutting operations in or near tanks. Whenever possible, avoid hot work and consider alternative methods. Analyze the hazards, prior to initiation of hot work, perform a hazard assessment that identifies the scope of work, potential hazards, and methods of hazard control.

- Work is not allowed and shall not be performed in or near closed tanks that contain or have contained flammable liquids. The tanks must be thoroughly drained, purged, and atmospherically tested with a combustible gas meter (indicator). This will ensure the tank is free from the accumulation of flammable gases or vapors.
- Once approved safe for hot work, atmospheric monitoring must be performed using a portable combustible gas analyzer before and during the work by only trained personnel (PAI or EHS staff). Assistance can be obtained with atmospheric monitoring by contacting EHS Department at 336-758-3427.
- If any detectable readings are obtained, then work cannot begin or continue until the source of vapor is found and suitable mitigated such that the concentration is maintained below 10% of the Lower Flammable/Explosive Limit. For technical assistance regarding combustible gas meters, contact EHS Department at 336-758-3427.

E. Electric Shock Hazards and Safety Precautions

Electric shock from electrical welding and cutting equipment can result in death or severe burns. Additionally, serious injury can occur if the welder falls as a result of the shock. This safety hazard is associated with operations that use electricity to generate heat, such as arc and resistance welding and cutting.

Employees are to use proper precautionary measures and recommended safe practices at all times to avoid electrical shocks. Personnel using electrical welding and cutting equipment must be trained on safe work practices and procedures before use of this equipment. Some measure to prevent electrical shock include:

- Never use a bare hand or wet glove to change electrodes.
- Do not touch an energized electrode while you are in contact with the work circuit.
- Never stand on a wet or grounded surface when changing electrodes.
- Do not allow the electrode holder or electrode to come in contact with any other person or any grounded object.
- Ground the frames of welding units.
- Insulate yourself from the workpiece and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground, or wear properly designed and approved rubber-soled boots in good condition.
ventilation system. These systems include a capture device, ducting, hood, and a fan. The capture devices remove fumes and gases at their source. Some systems filter the airflow before exhausting it. Fixed or moveable capture devices are placed near or around the work. They can keep contaminants below allowable limits. When using mechanical ventilation remember to:

a. Locate the hood as close as possible to the work.
b. Position the hood to draw the plume away from the breathing zone.
c. Curtains may be used to direct airflow.

- Cutting of Stainless Steel: Oxygen cutting, using either a chemical flux or iron powder or gas-shielded arc cutting of stainless steel, shall be done using mechanical ventilation adequate to remove the fumes generated.

4. Personal Protective Equipment for Welding and Cutting

Employees exposed to the hazards created by welding, cutting, or brazing operations shall be protected by personal protective equipment (PPE) in accordance with the requirements of OSHA standard 1910.132. Appropriate protective clothing required for any welding operation will vary with the size, nature and location of the work to be performed. PPE must protect against hazards such as burns, sparks, spatter, electric shock, and optical radiation.

A. Body Protection

Clothing shall provide sufficient coverage, and be made of suitable materials, to minimize skin burns caused by sparks, spatter, or radiation. Wear oil-free protective clothing made of wool or heavy cotton. Heavier materials work best. Choose clothing that allows freedom of movement and covers all areas of exposed skin. Wear long sleeved shirts (no t-shirts), and button the cuffs, pockets, and collar. They will protect your arms and neck from exposure and skin burns. Wear leather aprons (leather or other material that protects against radiated heat and sparks), leggings, capes, and sleeves as needed for the application. Keep clothing dry. Change it when needed (this reduces the possibility of electric shock). Keep clothing clean (free of oil, grease, or solvents which may catch fire and burn easily). Keep it in good repair (no holes, tears, or frayed edges). Always follow the manufacturer’s direction for their use, care, and maintenance. Remove all flammables and matches and cigarette lighters from your pockets. Do not wear synthetic (man-made) fabrics because they may burn easily, melt, stick to your skin, and cause serious burns.

B. Foot and Leg Protection

Wear leather, steel-toed, high-topped boots in good condition. They will help protect your feet and ankles from injury. In heavy spark and slag areas, use fire-resistant boot protectors or leather spats strapped round your pant legs and boot tops to prevent injury.
chips, grinding fragments, wire wheel bristles, and similar hazards. Spectacles with side shields or impact safety goggles, combined with the use of a face shield approved at the ANSI Z87+ level is required for protection against these hazards. The PPE should be stamped ANSI Z87+. The spectacles or goggles may have either clear or filtered lenses, depending upon the amount of exposure to adjacent welding or cutting radiation. Others in the immediate welding area should wear similar eye protection.

7. Approved Fire Resistant Materials for Hot Work Areas

A. Welding Blanket

A heat-resistant fabric designed to be placed in the vicinity of a hot work operation. Intended for use in horizontal applications with light to moderate exposures such as that resulting from chipping, grinding, heat treating, sand blasting, and light horizontal welding. Designed to protect machinery and prevent ignition of combustibles such as wood that are located adjacent to the underside of the blanket. They are made from different materials such as fiberglass, Silica, and other fire resistant materials.

B. Welding Pads

A heat-resistant fabric designed to be placed directly under a hot work operation such as welding or cutting. Welding pads are intended for use horizontal applications with severe exposures such as that resulting from molten substances of heavy horizontal welding. Designed to prevent the ignition of combustibles that are located adjacent to the underside of the pad.

C. Welding Curtain

A heat-resistant fabric designed to be placed in the vicinity of a hot work operation. Intended for use in vertical application with light to moderate exposures such as that resulting from chipping, grinding, heat treating, and light horizontal welding. Designed to prevent sparks from escaping a confined area.

*Welding blankets and curtains are required to be listed, approved, or the equivalent for such use. One such approval includes ANSI/FM 4950, American National Standard for Evaluating Welding Pads, Welding Blankets and Welding Curtains for Hot Work Operations.
HOT WORK PERMIT

*Instructions for Permit Authorizing Individual (PAI) or Supervisor:
1. Verify precautions listed below or DO NOT proceed with work!
2. Fill in all blanks (using N/A where ‘not applicable’)
   Post this form at work site where it will be maintained until work is complete. Upon completion of the work, return this form to the Department of Environmental, Health, and Safety.

Date: ___________________ Work Order # or Confined Space Permit #

Location/Building/Floor (be specific) ____________________________________________

Description of Work Being Performed __________________________________________

Name of person doing hot work: ________________________ (print)

HOT WORK CHECKLIST

<table>
<thead>
<tr>
<th>Item</th>
<th>Status</th>
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<tbody>
<tr>
<td>Sprinklers and host streams in service &amp; operable</td>
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<tr>
<td>Hot Work equipment in good condition (i.e. power sources, welding leads, torches)</td>
<td></td>
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<tr>
<td>Multi-purpose fire extinguisher and/or water pump pan</td>
<td></td>
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<tr>
<td>Dust, debris, flammable liquids, and oily deposits are more than 35’ from work</td>
<td></td>
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<tr>
<td>Explosive atmosphere in area has been eliminated</td>
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<tr>
<td>Combustibles (wood floors, tile, carpeting) have been wet down, covered with damp sand or fire blankets</td>
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<tr>
<td>Flammable and combustible materials have been removed where possible or otherwise protected by guards</td>
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<tr>
<td>All wall and floor openings have been covered and walkways beneath hot work have been protected</td>
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<tr>
<td>Confined space (if applicable) has been cleaned of all combustibles</td>
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<tr>
<td>Containers of flammable liquids/vapors have been moved an acceptable distance from hot work area</td>
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<tr>
<td>Confined space entry guidelines have been followed</td>
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<tr>
<td>Fire watch will be provided during and for 30 minutes following the hot work -including any/all break times</td>
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<tr>
<td>Fire watch has been supplies with an extinguisher and/or water pump can</td>
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<tr>
<td>Fire watch is trained in use of fire extinguisher equipment and familiar with location of audible alarm</td>
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<tr>
<td>Fire watch, if needed., will be placed on opposite side of walls, and below floors and ceilings</td>
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<tr>
<td>Please put your initial in the upper left corner of this form</td>
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<tr>
<td>Other precautions?</td>
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</tbody>
</table>

*The above location has been examined, the precautions checked on the Hot Work Checklist have been taken to prevent fire, and permissions is authorized for this work. Also, work area and adjacent areas to which sparks and heat might spread have been inspected and will be watched during the Hot Work operation.

Supervisor or Permit Authorizing Individual (PAI) Signature ____________________ Date ____________

Person Doing Hot Work Signature ____________________ Date ____________

Fire Watch Sign-Off (if applicable) ____________________ Date ____________

Date Started ____________ Time Started ____________ a.m. _____ p.m. ___